# PATENT ABSTRACTS OF JAPAN

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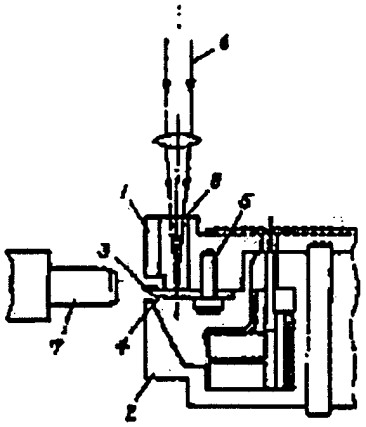
## (54) MAGNETIC RECORDING AND REPRODUCING DEVICE

(57)Abstract:
PURPOSE: To provide a magnetic recording and reproducing device capable of an adjusting method in which due to the temperature and the mechanical vibration of a head height fitted at a rotating cylinder does not change, in the magnetic recording and reproducing device with the rotating cylinder.
CONSTITUTION: At an upper cylinder 1 near a head base 4 fitted at an upper cylinder 1, a through hole 8 is provided, a laser beam 6 is irradiated near the part to stick a head chip 3 through the through hole 8 and the head base 4 is deformed only for the prescribed quantity by the welding deformation.



## DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is explanatory drawing showing the head height adjustment mechanism by the vertical cylinder and laser beam explaining the example of this invention.
[Drawing 2] It is explanatory drawing showing the head height adjustment mechanism by the vertical cylinder and laser beam explaining other examples of this invention.
[Drawing 3] It is explanatory drawing showing the head height adjustment mechanism by the vertical cylinder and laser beam explaining other examples of this invention.
[Drawing 4] It is explanatory drawing explaining the definition of head height.
[Drawing 5] It is explanatory drawing explaining the conventional head height adjustment method.
[Description of Notations]
1 Upper Cylinder
2 Lower Cylinder
3 Head Chip
4 Head Base
5 Fixed Screw
6 Laser Beam
7 Objective Lens
8 Through Hole
9 Mirror
10 Insect Screw
11 Tape-Guide Edge

## DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] this invention relates to the height adjustment of the magnetic head carried in the rotating cylinder of a magnetic recorder and reproducing device.
[0002]
[Description of the Prior Art] The positioning accuracy of the magnetic head used for a magnetic recorder and reproducing device is an important precision which opts for the format of the information recorded on a medium.
[0003] For example, in the video tape recorder which has spread widely as home use, one pair of magnetic heads which countered the rotating cylinder 180 degrees and were attached are carrying out record reproduction of a picture or the information on audio one by one, scanning in the direction of slant to a magnetic tape. The track pitch actually recorded on a magnetic tape is very narrow with 20 micrometers in 60 micrometers and the 6-hour mode in the mode for 2 hours.
[0004] When one pair of magnetic heads temporarily mentioned above cannot scan these truck top correctly, the recorded information will not be able to be reproduced correctly but the quality of image of a reproduction picture will deteriorate remarkably. Although it is necessary to double with the track pitch which mentioned the scanning pitch of the magnetic head above correctly in order to prevent this, the height of the magnetic head is in the important factor which determines this scanning pitch.
[0005] It is the thing of the distance of the tape-guide edge 11 in the predetermined position of the lower cylinder 2 indicated to be the height of the magnetic head to drawing 3 , and the gap edge of the head fixed to the upper cylinder 1.
[0006] The conventional head height adjustment method is explained below using drawing 4 . First, after carrying out rough adjustment on both sides of a given thickness Mino spacer (not shown) between the upper cylinder 1 and the head base 4 on which the head chip 3 was stuck, head height is measured using an objective lens 7, and the amount of adjustments required in order to adjust to predetermined height is computed.
[0007] Next, head height is adjusted by making only the part of the required amount of adjustments transform the head base for the insect screw 10 which has hit some head bases 4 partially. If there is need, this work will be repeated and will be performed.
[0008]
[Problem(s) to be Solved by the Invention] The foundations of the adjustment using the conventional insect screw are in the point of using deformation of the head base by the pushing force of the insect screw within the limitation of the elastic deformation of the head base. In such a case, if the amount of pushing of an insect screw changes by a mechanical vibration and a mechanical temperature change, the deformation of the head base has a possibility that only the part may change and head height may change after all.
[0009] The temperature change by aging of heat, change of an operating environment, etc. which rotation, tape conveyance, etc. of a cylinder have various factors which generate vibration in actual VTR, and are generated from those drive systems is not avoided.
[0010] Although the influence from these factors was minimized and the screw slack inhibitor (resin which fixes in ordinary temperature) was utterly used to the insect screw now, the effect was not enough and head height had changed to several microns order. Change of this head height is one of the important factors which influence the quality of image of VTR.
[0011] Moreover, since the relative position to the lower cylinder of the upper cylinder to rotate changed with rotations of a shaft when a fluid bearing was used for the bearing of a rotating cylinder, it is difficult to secure precision sufficient in the conventional method by adjustment by the quiescent state, and tuning could not but become trial-and-error after all.
[0012] And tuning with an actual insect screw was performed by people's hand, and was quite complicated.
[0013] The purpose of this invention solves the above-mentioned problem, and is to offer the method that the head height of the magnetic head can moreover be adjusted to high efficiency with high precision, without being influenced by vibration and the temperature change.

[0014]
[Means for Solving the Problem] In order to attain this purpose, this invention is characterized by adjusting the height of the magnetic head by irradiating each field of the aforementioned head base and carrying out the angular distortion of the both sides by the side of the rotating cylinder of the head base, and a fixed cylinder to the laser beam in a laser beam irradiation portion. [0015]
[Function] Since this invention can adjust head height where an upper cylinder is rotated by using laser processing which can be made to transform the head base by non-contact, it has operation that highly precise adjustment can be performed quickly.
[0016]
[Example] The example of the height adjustment of the magnetic head by this invention is explained using drawing 1 . The head base 4 with a thickness of 1.5mm it is thin from the brass on which the head chip 3 was stuck was attached in the upper cylinder 1, and the upper cylinder 1 was fixed to the lower cylinder 2.
[0017] In this example, the short pulse oscillation of Nd:YAG laser (wavelength of 1.06 micrometers) was used as a laser beam 6. Moreover, the laser energy acquired when pulse width of the flash plate light for excitation was set to 1msec and excitation voltage was set to 450volt(s) was about 1J per one pulse. The diameter of condensing of an YAG laser was taken as 200um(s).
[0018] The through hole 8 for letting a laser beam 6 pass is formed in the upper cylinder 1 in this example. This through hole was prolonged, is circular to a hand of cut, and has a length of 7mm in it. In order to have let the aforementioned laser beam 6 pass, making it actually rotate, the oscillation of laser was synchronized and was performed to rotation of the upper cylinder 1.
[0019] The size H from the predetermined position of a lower cylinder was decided like drawing 4 , and head height needs to put together the truck height of the head chip pasted up on the head base. When head height was measured using the objective lens 7, actually rotating an upper cylinder at a regular rotational frequency, it was -6.5um to the aforementioned size. Therefore, when the laser beam was irradiated at the head base from the upper part of a through hole established in the upper cylinder and the head base was made to transform, the obtained deformation was a gap of only 0.5 um(s) to 6um(s) and the aim.
[0020] Moreover, another example is explained using drawing 2 . By the head chip pasted up on the head base, the truck height of a head is minus or plus to the aforementioned size H. If it is plus, what is necessary will be just to irradiate a lower cylinder side to laser from an upper cylinder side to the aforementioned size H, if it is minus, in order for the head base 4 to deform into an irradiation side by irradiation of laser. When head height was measured using the objective lens 7, actually rotating an upper cylinder at a regular rotational frequency, it was +10um to the aforementioned size. Therefore, the deformation obtained when the base was made to transform using the laser by the side of a lower cylinder was a gap of only 0.3 um(s) to 9.7um(s) and the aim.
[0021] Moreover, another example is explained using drawing 3 . The through hole 8 for irradiating the upper cylinder 1 from the through hole 8 for irradiating laser from the upper part of the head base 4 and the head base 4 bottom is formed. Since laser 6 is irradiated from the head base 4 bottom at the lower cylinder 2, the mirror 9 for turning the laser 6 irradiated from the bottom 180 degrees has been formed. Prism is sufficient as it, and if this mirror is got blocked and changes the direction of radiation of a laser beam, it is good anything. One inside a lower cylinder is sufficient as the position of one pair of mirrors 9, and when the head base rotates in the place there, it should just irradiate laser. Since what is necessary is just to prepare one pair of mirrors in a lower cylinder as a means to irradiate from the head base bottom, double-sided irradiation of laser is attained with a very cheap and easy means.
[0022] By the way, since the magnetic recorder and reproducing device which used the fluid bearing was used, although head height was adjusted in this example, rotating a rotating cylinder, as long as it is the magnetic recorder and reproducing device from which head height does not change by the quiescent state, you may carry out height adjustment by the quiescent state. Moreover, theoretically, although the welding distortion by irradiation of the laser beam which used the light energy was used in this example, if it is the method that partial heating can be performed, it is good anything. For example, the arc welding using electrical energy, electron beam welding, the ultrasonic welding using ultrasonic energy, the gas welding using chemical energy, etc. are raised.
[0023] Since the head height adjustment by this invention described above is based on the plastic deformation of the head base, not using an insect screw, it is not influenced at all by the mechanical oscillation or the temperature change which became a problem by the former. Actually, although the heat shock examination by the repeat (-40 degrees C

and 80 degrees C) was performed, the deformation of the head base before and behind an examination did not change in the precision of 0.1 micrometers or less.

[0024] Moreover, it is also possible to automate irradiation of laser, the drive system of the lens for condensing, and system of measurement by carrying out computer control. By automating this tuning of a series of, it becomes possible to include in an actual VTR mass-production line, compares until now, and is more highly precise, and it is in Ming that reliable head height adjustment can carry out now more quickly.

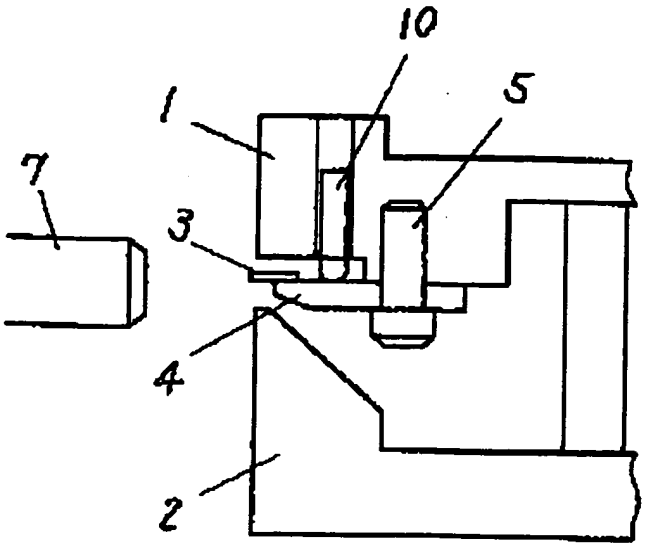
[0025]

[Effect of the Invention] According to this invention, as the example described above, the through hole is prepared in the rotating cylinder of near where the head base is being fixed, irrespective of rotation and the quiescent state of a cylinder, laser is irradiated at the head base through a through hole, and head height can be adjusted. Therefore, there is an advantage that highly precise head height adjustment can be performed very easily, and by automating, it becomes possible to include in a VTR mass-production line, and the productivity improves by leaps and bounds. Furthermore, according to this invention, since head height is influenced by neither mechanical oscillation nor the temperature change, it makes easy realization of the high definition VTR by the formation of a ** truck.

## CLAIMS

(57) [Claim(s)]

[Claim 1] The height adjustment method of the magnetic head characterized by adjusting the height of the magnetic head by irradiating each field of the aforementioned head base and carrying out the angular distortion of the both sides by the side of the aforementioned rotating cylinder of the aforementioned head base, and the aforementioned fixed cylinder to the laser beam in a laser beam irradiation portion in the magnetic recorder and reproducing device which has the rotating cylinder by which the magnetic head which fixed the head chip was carried at the nose of cam of the head base, and a fixed cylinder.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1 … 上シリンダー
2 … 下シリンダー
3 … ヘッドチップ
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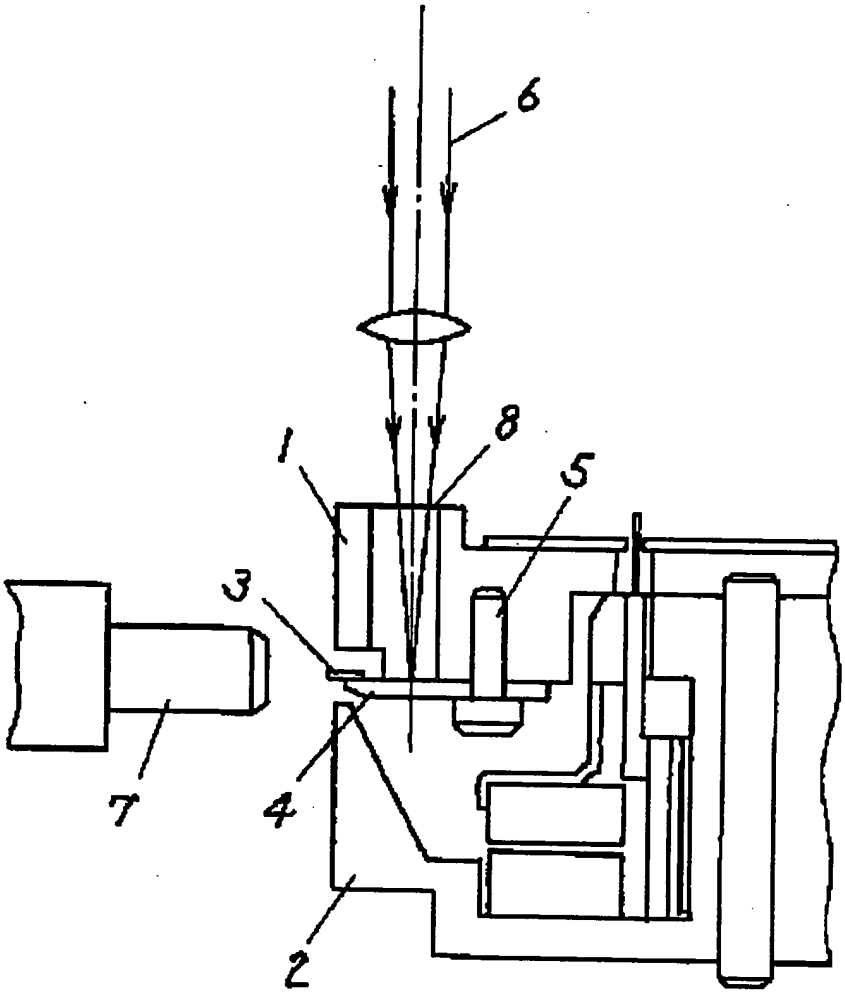
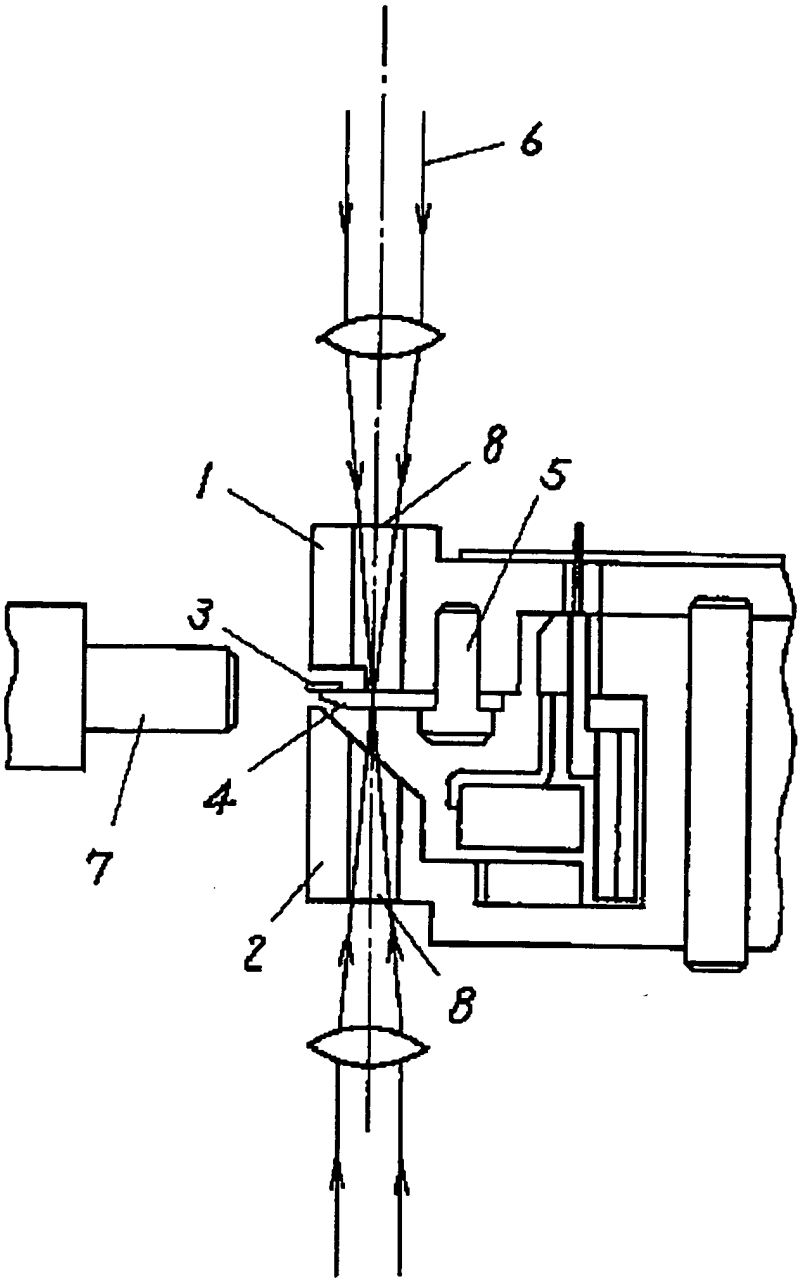
5 … 固定ネジ
6 … レーザー光
7 … 対物レンズ
8 … 貫通穴

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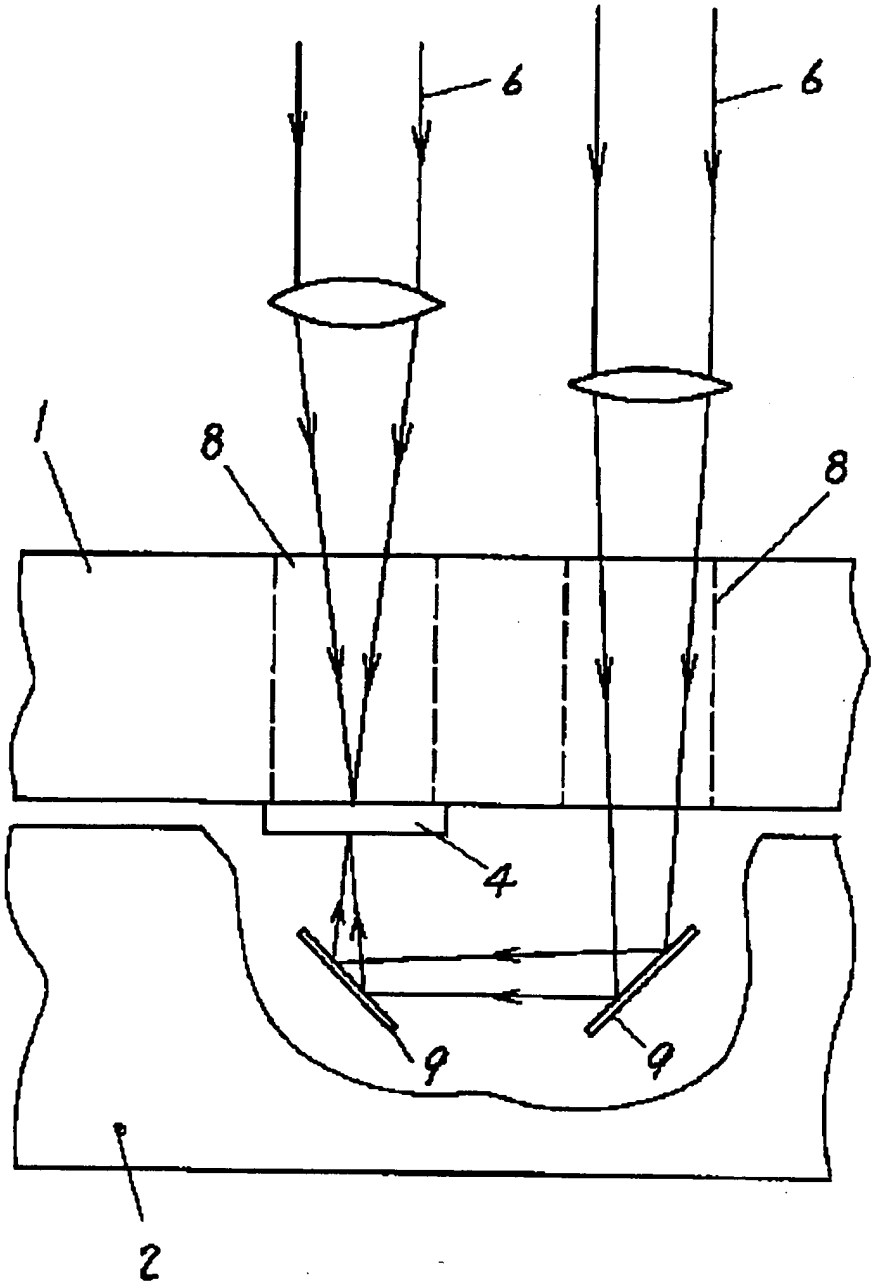
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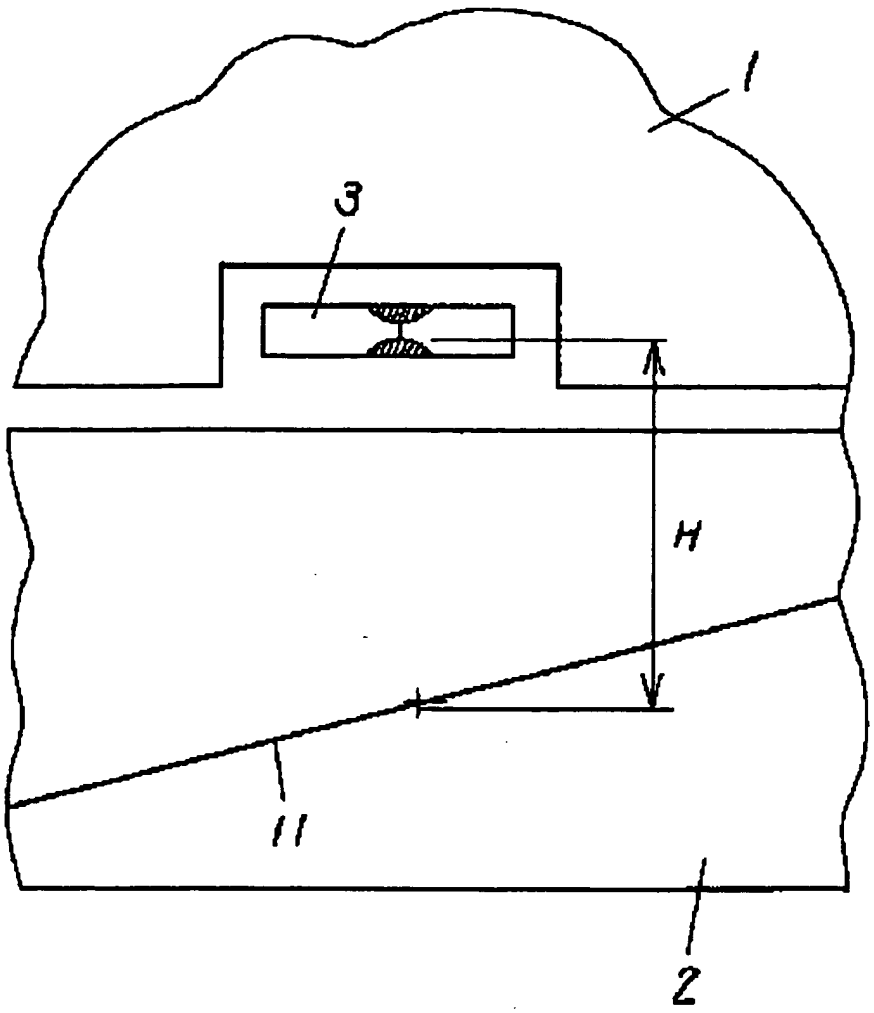
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